

What is claimed is:

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1. A solid-state image pickup device comprising
first and second insulating films formed on a surface of a
semiconductor substrate,
- 5 a solid-state image pickup region having, as a charge
transfer electrode, an electrically conductive single-layer
material film formed on said first insulating film, and
a peripheral circuit region formed on said semiconductor
substrate other than in said solid-state image pickup region, a
10 device in said peripheral circuit region being isolated from
another device by means of an isolating electrode on said second
insulating film, and said isolating electrode being formed of
said single-layer conductive material film.
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2. The solid-state image pickup device according to claim 1,
15 wherein
a gate electrode constituting a transistor in said
peripheral circuit region is formed on the first insulating film
in said peripheral circuit region, and said gate electrode is
formed in the same step as that of said isolating electrode.
- 20 3. The solid-state image pickup device according to claim 1,
wherein
said second insulating film is thicker than said first
insulating film.
4. The solid-state image pickup device according to claim 1,
25 wherein
said second insulating film has the same thickness as said
first insulating film.
5. The solid-state image pickup device according to claim 1,

wherein

said first and second insulating films are formed of the same material film.

6. The solid-state image pickup device according to claim 1,
5 wherein

a third insulating film is formed on the surface of said semiconductor substrate in addition to said first and second insulating films, a gate electrode constituting a transistor in said peripheral circuit region is formed on the third insulating
10 film in said peripheral circuit region, and said gate electrode is formed in the same step as that of said isolating electrode.

7. The solid-state image pickup device according to claim 6,
wherein

said third insulating film is thinner than said first
15 insulating film, and said second insulating film is thicker than said first insulating film.

8. The solid-state image pickup device according to claim 6,
wherein

said third insulating film is thinner than said first
20 insulating film, and said second insulating film has the same thickness as said first insulating film.

9. The solid-state image pickup device according to claim 1,
wherein

a first diffusion layer for device isolation is formed on
25 the semiconductor substrate in said solid-state image pickup region,

a second diffusion layer for device isolation is formed on the semiconductor substrate below the isolating electrode in said

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peripheral circuit region, and

said first and second diffusion layers are formed in the same step.

10. The solid-state image pickup device according to claim
5 6, wherein

a first diffusion layer for device isolation is formed on the semiconductor substrate in said solid-state image pickup region,

a second diffusion layer for device isolation is formed on
10 the semiconductor substrate below the isolating electrode in said peripheral circuit region, and

said first and second diffusion layers are formed in the same step.

11. The solid-state image pickup device according to claim
15 1, wherein

a first diffusion layer for isolating a device from another is formed on the semiconductor substrate in said solid-state image pickup region,

a second diffusion layer for isolating a device from
20 another is formed on the semiconductor substrate below the isolating electrode in said peripheral circuit region, and

said first and second diffusion layers are formed in different steps.

12. The solid-state image pickup device according to claim
25 6, wherein

a first diffusion layer for isolating a device from another is formed on the semiconductor substrate in said solid-state image pickup region,

a second diffusion layer for isolating a device from another is formed on the semiconductor substrate below the isolating electrode in said peripheral circuit region, and said first and second diffusion layers are formed in
5 different steps.

13. The solid-state image pickup device according to claim 11, wherein

said second diffusion layer is higher in impurity concentration than said first diffusion layer.

10 14. The solid-state image pickup device according to claim 12, wherein

said second diffusion layer is higher in impurity concentration than said first diffusion layer.

15 15. The solid-state image pickup device according to claim 11, wherein

said second diffusion layer is formed to be separated into at least two regions on the semiconductor substrate below said isolating electrode, and

20 at least one of the regions is connected to said isolating electrode.

16. The solid-state image pickup device according to claim 12, wherein

25 said second diffusion layer is formed to be separated into at least two regions on the semiconductor substrate below said isolating electrode, and

at least one of the regions is connected to said isolating electrode.

17. The solid-state image pickup device according to claim

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13, wherein

said second diffusion layer is formed to be separated into at least two regions on the semiconductor substrate below said isolating electrode, and

5 at least one of the regions is connected to said isolating electrode.

18. The solid-state image pickup device according to claim 14, wherein

10 said second diffusion layer is formed to be separated into at least two regions on the semiconductor substrate below said isolating electrode, and

at least one of the regions is connected to said isolating electrode.

15 19. The solid-state image pickup device according to claim 1, wherein

said electrically conductive single-layer material film is formed of a polysilicon film.

20. The solid-state image pickup device according to claim 6, wherein

20 said electrically conductive single-layer material film is formed of a polysilicon film.

21. The solid-state image pickup device according to claim 1, wherein

25 said electrically conductive single-layer material film is formed of a layered film of a polysilicon film and a metal silicide film formed on the polysilicon film.

22. The solid-state image pickup device according to claim 6, wherein

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said electrically conductive single-layer material film is formed of a layered film of a polysilicon film and a metal silicide film formed on the polysilicon film.

23. The solid-state image pickup device according to claim 5 1, wherein

said electrically conductive single-layer material film is formed of a metal film.

24. The solid-state image pickup device according to claim 6, wherein

10 said electrically conductive single-layer material film is formed of a metal film.

25. The solid-state image pickup device according to claim 1, wherein

15 a fourth insulating film is buried between electrodes formed of said electrically conductive single-layer material film, and

a surface of the semiconductor substrate comprising said electrodes and said fourth insulating film is made generally flat.

26. The solid-state image pickup device according to claim 20 6, wherein

a fourth insulating film is buried between electrodes formed of said electrically conductive single-layer material film, and

25 a surface of the semiconductor substrate comprising said electrodes and said fourth insulating film is made generally flat.

27. The solid-state image pickup device according to claim 1, wherein

a constant voltage is applied to said isolating electrode.

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28. The solid-state image pickup device according to claim 6, wherein

a constant voltage is applied to said isolating electrode.

29. A method for fabricating a solid-state image pickup device, comprising the steps of:

forming, in a solid-state image pickup region of a semiconductor substrate, a first diffusion layer for isolating a device from another in said solid-state image pickup region and in a peripheral circuit region other than the solid-state image pickup region of said semiconductor substrate, a second diffusion layer for isolating a device from another in said peripheral circuit region, respectively,

forming, on a surface of the semiconductor substrate of said solid-state image pickup region, a first insulating film and on a surface of the semiconductor substrate of said peripheral circuit region, at least a second insulating film, respectively,

depositing an electrically conductive electrode material film on a surface of the semiconductor substrate including said first and second insulating films, and

forming a charge transfer electrode on said first insulating film of said solid-state image pickup region by patterning said electrically conductive electrode material film and an isolating electrode on said second insulating film of said peripheral circuit region, respectively.

30. The method for fabricating a solid-state image pickup device according to claim 29, wherein

in the step of forming said first and second diffusion layers,

said first and second diffusion layers are formed at the same time.

31. The method for fabricating a solid-state image pickup device according to claim 29, wherein

5 in the step of forming said first and second diffusion layers,

said first and second diffusion layers are formed independent of each other.

32. The method for fabricating a solid-state image pickup
10 device according to claim 31, wherein

said second diffusion layer is higher in impurity concentration than said first diffusion layer.

33. The method for fabricating a solid-state image pickup device according to claim 29, wherein

15 in the step of forming said first and second insulating films,

said first and second insulating films are formed at the same time.

34. The method for fabricating a solid-state image pickup
20 device according to claim 29, wherein

in the step of forming said first and second insulating films,

said first and second insulating films are formed independent of each other, and

25 said second insulating film is thicker than said first insulating film.

35. The method for fabricating a solid-state image pickup device according to claim 29, wherein

the step of forming, on the surface of the semiconductor substrate of said solid-state image pickup region, the first insulating film and on the surface of the semiconductor substrate of said peripheral circuit region, at least the second insulating film, respectively, comprises the step of forming, on the surface of the semiconductor substrate of said solid-state image pickup region, the first insulating film and on the surface of the semiconductor substrate of said peripheral circuit region, the first and second insulating films, respectively, and

in the step of forming the charge transfer electrode on said first insulating film of said solid-state image pickup region by patterning said electrically conductive electrode material film and the isolating electrode on said second insulating film of said peripheral circuit region, respectively,

a gate electrode formed of said electrically conductive electrode material film of said peripheral circuit region is formed at the same time on said first insulating film of said peripheral circuit region.

36. The method for fabricating a solid-state image pickup device according to claim 29, wherein

the step of forming, on the surface of the semiconductor substrate of said solid-state image pickup region, the first insulating film and on the surface of the semiconductor substrate of said peripheral circuit region, at least the second insulating film, respectively, comprises the step of forming, on the surface of the semiconductor substrate of said solid-state image pickup region, the first insulating film and on the surface of the semiconductor substrate of said peripheral circuit region, the

in the step of forming the charge transfer electrode on said first insulating film of said solid-state image pickup region by patterning said electrically conductive electrode material film and the isolating electrode on said second insulating film of said peripheral circuit region, respectively,

37. The method for fabricating a solid-state image pickup device according to claim 36, wherein

in the step of forming, on the surface of the semiconductor
15 substrate of said solid-state image pickup region, the first
insulating film and on the surface of the semiconductor substrate
of said peripheral circuit region, the second and third
insulating films, respectively,

said third insulating film is formed to be thinner than
20 said first insulating film.

38. The method for fabricating a solid-state image pickup device according to claim 29, wherein

the step of patterning said electrically conductive electrode material film is followed by the step of burying a fourth insulating film between electrodes formed of said
25 electrically conductive electrode material film including said charge transfer electrode and said isolating electrode.

39. The method for fabricating a solid-state image pickup

device according to claim 35, wherein

the step of patterning said electrically conductive
electrode material film is followed by the step of burying a
fourth insulating film between electrodes formed of said
5 electrically conductive electrode material film including said
charge transfer electrode and said isolating electrode.

40. The method for fabricating a solid-state image pickup
device according to claim 36, wherein

the step of patterning said electrically conductive
10 electrode material film is followed by the step of burying a
fourth insulating film between electrodes formed of said
electrically conductive electrode material film including said
charge transfer electrode and said isolating electrode.

41. The method for fabricating a solid-state image pickup
15 device according to claim 38, wherein

the step of burying the fourth insulating film between
electrodes formed of said electrically conductive electrode
material film is performed by

depositing an insulating film made flowing by heat on the
20 surface of said semiconductor substrate including said electrodes
to be thicker than said electrodes,

flattening the surface of said insulating film through heat
treatment on said insulating film, and

etching uniformly said insulating film from a surface
25 thereof to bury said insulating film between said electrodes.

42. The method for fabricating a solid-state image pickup
device according to claim 39, wherein

the step of burying the fourth insulating film between

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electrodes formed of said electrically conductive electrode material film is performed by

depositing an insulating film made flowing by heat on the surface of said semiconductor substrate including said electrodes
5 to be thicker than said electrodes,

flattening the surface of said insulating film through heat treatment on said insulating film, and

etching uniformly said insulating film from a surface thereof to bury said insulating film between said electrodes.

10 43. The method for fabricating a solid-state image pickup device according to claim 40, wherein

the step of burying the fourth insulating film between electrodes formed of said electrically conductive electrode material film is performed by

15 depositing an insulating film made flowing by heat on the surface of said semiconductor substrate including said electrodes to be thicker than said electrodes,

flattening the surface of said insulating film through heat treatment on said insulating film, and

20 etching uniformly said insulating film from a surface thereof to bury said insulating film between said electrodes.